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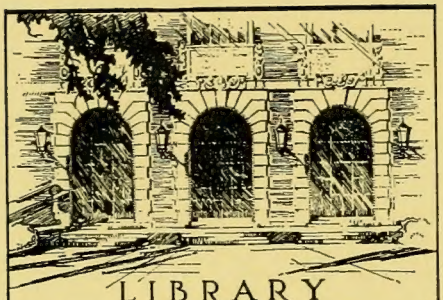

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PRELIMINARY REPORT ON THE CANADA GEESE OF THE MISSISSIPPI FLYWAY

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and
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PRELIMINARY REPORT ON THE CANADA GEESE OF THE MISSISSIPPI FLYWAY

Harold C. Hanson and Robert H. Smith*

That the sound management of waterfowl and other wildlife species must in the last analysis rely on carefully gathered scientific data is axiomatic. Because the range of most waterfowl species is immense, and because some populations shift their distribution within a flyway from year to year as a result of changing food, water, and weather conditions, adequate scientific data from all parts of the range are difficult to secure.

The present paper on the Canada geese of the Mississippi Flyway is a preliminary report of a study that represents combined efforts and support of six agencies: the Natural History Survey Division of the Illinois State Department of Registration and Education; the U. S. Fish and Wildlife Service; the Illinois State Department of Conservation; the Lands, Parks, and Forests Branch of the Canadian Department of Mines and Resources; the Jack Miner Migratory Bird Foundation, Inc.; and the Arctic Institute of North America.

Biologists of these agencies have studied the Canada goose of the Mississippi Flyway at most of its important concentration points from Hudson Bay to the Gulf of Mexico. An

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intensive study and banding program has been carried out at the important wintering area centering on Horseshoe Lake, Alexander County, in southern Illinois, where the Illinois State Department of Conservation maintains a game refuge.

Because printing difficulties and a shortage of suitable paper give promise of further delays in publishing the final report on the study, the present preliminary report is issued at this time. Issuance of this report now will make possible the inclusion in the final report of data and information derived from an additional year of study.

Status of Mississippi Flyway Geese

In 1946, 14 states of the Mississippi Flyway (Michigan, Wisconsin, Minnesota, Ohio, Indiana, Illinois, Iowa, Kentucky, Tennessee, Missouri, Mississippi, Alabama, Arkansas, and Louisiana) were closed to the hunting of Canada geese. The closed season of an entire flyway was the first of its kind in the history of this species of waterfowl. The only similar actions were those closing the shooting seasons on snow geese and brant in the Atlantic Coast states. Snow goose hunting has been prohibited there since 1931, and brant hunting for 9 of the 15 years since 1933.

Closing the season on Canada geese in the Mississippi Flyway was necessary for a number of reasons: a rapid decrease in the number of these geese in the flyway from 144,843 in 1940

to 72,770 in 1945; increased kills beginning in 1939, particularly in the region of Horseshoe Lake; a disproportionate kill of juvenile birds and an apparent decreased productivity in 1945, as indicated by research at Horseshoe Lake. Tables 1, 2, and 3 present detailed figures on this situation.

The number of geese wintering at Horseshoe Lake dropped from about 50,000 in 1943-44 to 26,000 in 1945-46. That this decrease represented a real decrease in the flyway population and was not due to by-passing of the area by flocks is shown not only by flyway censuses but by band recovery records; these records indicate that since 1932 many of the geese that formerly used the Mississippi from Cairo, Illinois, to Baton Rouge, Louisiana, have concentrated in a much smaller area centering on Horseshoe Lake, because of the refuge there and the large amount of grain made available to them.

Calculated total kill figures indicate that in each of the recent hunting seasons between 23 and 46 per cent of the available Canada goose population in the Mississippi Flyway was shot. In view of the known relatively low productivity potential of the Canada goose, it was obvious that the birds could not stand a high kill. Recent population declines in the Mississippi Flyway showed that flock mortality from all causes combined had been excessive, and, as hunting losses are one type of mortality that can be controlled, it was evident that closing the flyway to shooting was the most effective management measure that could have been employed.

Evidence of increased shooting pressure on Canada geese in recent years is shown by lowered survival rates, as computed from band recoveries by hunters; these recoveries are from geese banded at the Jack Miner Bird Sanctuary, Kingsville, Ontario, and the Horseshoe Lake Game Refuge, maintained by the Illinois State Department of Conservation. Banding data on Horseshoe Lake geese show that the survival rates of the flock wintering there are below the averages for other populations in the flyway.

Contributing to the recent heavy kill of birds in the Horseshoe Lake area was an apparent alteration in the habits of the geese wintering there. In recent years the birds have lacked the wariness usual in the Canada goose. Although this goose possesses a natural wariness that has given it a high survival rate under primitive conditions, individuals appear unable to solve problems of self-preservation that arise in a greatly modified environment such as that at Horseshoe Lake. During recent hunting seasons there, the geese exhibited an almost complete disregard of gunfire, flying back day after day to fields that were heavily shot.

Calculations based on the survival series obtained for the Horseshoe Lake flock indicate that only 12 per cent of the juveniles lived long enough to raise a brood of young.

When a major portion of the annual kill of a Canada goose flock is at the expense of one age group, data on the

total number of birds bagged do not reveal the true impact of the kill upon the future reproductive capacity of the population. At Horseshoe Lake the juveniles made up the major part of the kill from the time this study began in 1940 until shooting of the Canada goose was stopped in the Mississippi Flyway at the end of the 1945 season, table 3.

A year of low productivity in Canada geese should be of particular concern to the administrators who regulate the kill by hunters, for the reason that the young birds bear a double responsibility. Being more vulnerable to shooting than the adults, they must contribute a disproportionate share of the kill, and, secondly, they must survive in sufficient numbers to reproduce an equivalent of the annual loss in yearlings and the breeding population. Even in a year when the production of young was not significantly low, 1943, shooting losses in the Horseshoe Lake area were so severe and so greatly at the expense of the juveniles that only a small proportion of this generation survived to reach the minimum breeding age of 2 years.

Management

What can be done to insure the future of the Mississippi Flyway geese? Until recent years, the two prime measures for conserving waterfowl (refuges and hunting regulations) have

usually been fairly successful in the management of this group. With the population of geese dealt with in this report, it is apparent that since 1939 these measures as applied have not been very effective.

There is little that can be done to limit the kill of geese in Canada, because much of it is virtually necessary for the survival of the native Indians.

In 1944 and 1945, when season limits were imposed for Alexander County, it was a relatively easy matter to limit the kill of geese in the Horseshoe Lake area to a predetermined figure, due to the facility with which the day-to-day kill could be tallied. The season bag limit in the above instances was determined by the trend of the population in prior years, but, to be fully effective, management should anticipate future trends based upon the current composition of the population. With the data at hand on the Canada goose in the Mississippi Flyway, it is possible to arrive at a practical estimate of the maximum kill that can be tolerated.

Since the fall flight in any year depends to a large extent on the production of young in the spring of that year, to predict the flock population with reasonable accuracy, it is necessary to know the trends in numbers of breeding females and to have some measure of the nesting success on the breeding grounds. Inventory on the latter is not easy because of the nature of the terrain, but the use of planes aids tremendously in such work. For the present and until more data are available,

the average productivity of the flyway population might be calculated on the basis of four young (brought to flying stage) per adult female.

If the flock population has been fairly stable for several years, a 10 per cent kill in the Horseshoe Lake area might prove to be within the limits of what the flock could stand without decreasing in size. Even this kill might be too high if kills north of Horseshoe Lake were unusually large in a given autumn, if nesting success was low the previous spring, or if sex and age ratios were seriously unbalanced. The kill of a single bird, however, when the population is very low constitutes overshooting.

A reduction in the crippling loss would increase the permissible retrieved kill in the Horseshoe Lake area. The number of geese crippled and lost to hunters each year in the area is needlessly high. An estimate of cripples not retrieved, and later dying, is placed at 30 per cent of the retrieved kill. Certain administrative measures can be taken to reduce the per cent of cripples not retrieved, but the larger share of the responsibility rests with the hunter himself, who must restrain the natural desire to "give a high one a ride." Greater spacing of pits to reduce competition among hunters might aid in reducing crippling losses. Many hunters hope to bag geese with greater ease by using magnum shotguns. However, it is debatable whether more geese are bagged than crippled by such guns because of the out-of-range shooting their possession encourages.

The hunting restrictions most frequently used to reduce game kill to the desired level are simply a reduction in the length of the season or a further limitation of the bag. A study of kill and of hunting regulations in the Horseshoe Lake area shows that hunting restrictions were not always successful in reducing the kill to the desired extent, but, if various measures instituted to lower the annual kill had not been taken, it is probable that a large proportion of the Canada geese using the Horseshoe Lake area would have been shot by the end of 1946. It is clear that the goose kill at Horseshoe Lake needed to be restricted in a drastic manner, because the flock had lost so much of its natural wariness and become so vulnerable to hunting. In 1945, for example, there were only 5 half days of shooting, but the kill was, nevertheless, 5,200 bagged, another 800 to 1,000 crippled, plus lesser losses from miscellaneous causes.

Pirnie (1939) has emphasized that "Changing habits of these birds (geese) may create new hazards for them and require even more stringent regulations." The behavior of the Horseshoe Lake flock in recent years and its relation to shooting have already been discussed, but it should again be emphasized that restrictions alone cannot be expected to safeguard it.

Refuges form an important part of our system for the preservation of waterfowl. Whether or not any individual refuge proves of value will depend to a certain extent upon its management and also upon its size. Leopold (1931) stated the chief

problem in regard to the Horseshoe Lake Game Refuge soon after this refuge was created. "The question of whether public refuges should be surrounded by public shooting grounds is frequently debated. Horseshoe Lake in Alexander County, Illinois, is a good place to study the question."

The present food resources of the Horseshoe Lake Game Refuge are insufficient to winter more than 10,000 geese, and probably only 5,000 can be accommodated to best advantage. When the corn crop and wheat browse on the refuge are exhausted, and occasionally before this occurs, the flock feeds on unharvested and sometimes standing grain in the surrounding countryside -- occasionally at a considerable loss to farmers who do not rent their fields to hunters.

The breakdown in wariness that has occurred is perhaps more serious to the future of the Horseshoe Lake flock than the reduction of its size. It is believed that the steps necessary to reestablish wildness in the flock are (1) establish refuge areas on nearby islands and bars of the Mississippi River or on lands adjacent to the river; (2) disperse the geese from Horseshoe Lake to these bars and islands, i. e., drive them back to their original habitat; (3) insofar as possible, reduce contact between humans and the geese.

In past years when the geese used the river bars they retained their natural wildness; coincident with their almost complete dependence on the refuge for food and grit, they lost

much of their wildness. The river refuges should be the roosting areas for the flock, and ideally they should contain the bulk of the birds at most times.

Canada geese will readily feed by night, at daybreak, or at dusk, if disturbed by day. This fact may offer a partial solution to the Horseshoe Lake problem. If the geese were permitted to feed at the Horseshoe Lake Refuge only during the hours of dawn and dusk, the reestablishment of wildness might occur and with it a reduction in the rate of kill. We have a precedent for such a course of action in the operation of the Miner Sanctuary, where the geese feed only in the early morning hours and at dusk, spending the remainder of their time roosting on Lake Erie.

State regulations in recent years have prohibited the placing of shooting pits within 75 to 150 yards of the boundary of the Horseshoe Lake Refuge. This buffer zone, which is intended to allow the geese to attain safe heights before reaching the shooting pits and blinds, is unquestionably insufficient, since many of the geese leaving the refuge encounter shot 75 yards away from the first line of pits. Although the Miner Sanctuary consists of only 400 acres and supports an even greater density of geese than is ever experienced at Horseshoe Lake, there have not been excessive kills near there in late years. Responsible in part for the small kills reported in the vicinity of the Miner Sanctuary is a buffer zone that surrounds the feeding grounds and ponds for a distance of a mile. When geese

leave the refuge, they have sufficient space in which to gain altitude before passing over the shooting grounds.

The size of the Horseshoe Lake Refuge, on the other hand, is woefully inadequate for Canada geese, as experiences there and elsewhere have demonstrated so clearly. At present the refuge, because of its small size, results not in protection for Canada geese, but in a kill greater than if there were no refuge at all. As a goose refuge it has no logical basis for existence unless it is enlarged very considerably. A program of purchasing additional lands has been planned by the State Department of Conservation for several years, but has been blocked by the inflated prices of lands in the area, caused by the commercialization of the goose hunting.

Census data show that since 1942 the Canada goose in the Mississippi River valley has shown a marked decline in population. Kill records have shown an increase in the kill since 1939, and banding data have shown a concurrent decrease in goose survival for the same period. The conclusion must be reached that the Mississippi Flyway Canada goose population has been shot too heavily and that stringent protection is necessary to insure perpetuation of this population.

Table 1.--Inventory figures of Canada geese in the 14 states (Michigan, Wisconsin, Minnesota, Ohio, Indiana, Illinois, Iowa, Kentucky, Tennessee, Missouri, Mississippi, Alabama, Arkansas, and Louisiana) of the Mississippi Flyway closed to hunting of these geese in 1946.

Year	Number of Geese	Year	Number of Geese
1939-40	102,409	1943-44	93,149
1940-41	125,788	1944-45	72,270
1941-42	144,788	1945-46	53,530
1942-43	93,292	1946-47	63,140 (71,624)*

* The figure of 63,140 resulted from the regular January inventory conducted during the January 7-17, 1947, period in the normal manner, with the estimates made chiefly by aerial observations, but in some areas from ground counts. Later in the month, Cecil S. Williams and Robert H. Smith, both of the U. S. Fish and Wildlife Service, succeeded in taking aerial photographs of all geese resting on Horseshoe Lake and the nearby river bars, which made possible a completely accurate count from enlarged prints. The resulting figure was 8,484 greater than the number estimated during the inventory. Influx of some birds during the few days between the inventory estimates and the aerial photographs may be responsible for some of the difference, but it is clear that, in large part, it is a reflection of the more accurate technique. The larger figure, therefore (71,624), is believed to be the more nearly accurate one for the January, 1947, population, but the smaller one is also shown because it is comparable with previous inventories taken in the same manner and at the same season.

Table 2.--Annual shooting bag of Canada geese in the region of Horseshoe Lake, Alexander County, Illinois.

Year	Reported Kill by Licensed Clubs, Alexander County	Estimated Kill on Non-Club Grounds, Alexander County	Kill in Cape Girardeau, Scott, and Mississippi Counties, Missouri	Total Number of Canada Geese Bagged*
1927	--	--	--	1,200
1928	--	--	--	1,500
1929	--	--	--	1,800
1930	--	--	--	2,500
1931	--	--	--	1,800
1932	--	--	--	2,500
1933	--	--	--	2,500
1934	--	--	--	2,700
1935	--	--	--	2,250
1936	--	--	--	1,500
1937	--	--	--	5,000
1938	--	--	--	1,200
1939	17,300	--	--	17,300
1940	12,900	--	--	12,900
1941	6,524	100	150	6,774
1942	6,279	100	150	6,529
1943	11,162	600	300	12,062
1944	7,157	250	400	7,807
1945	4,444	500	300	5,244

* Kills of 1927-1938 estimated from information gathered from club owners and hunters familiar with the area. For an estimate of the total hunting loss, to the total number of geese bagged should be added approximately 30 per cent to compensate for birds crippled or killed and not bagged, and about 2 1/2 per cent to allow for birds illegally killed.

Table 3.--Number of Canada geese examined in bag in Horseshoe Lake area, 1940-1945, and number and percentage of juvenile geese.

Year	Geese Inspected in Bag	Number of Juveniles	Per Cent of Juveniles
1940	284	226	79.6
1941	79	50	63.3
1942	761	549	72.1
1943	173	158	91.3
1944	500	452	90.4
1945	857	689	80.4
Total or Average	2,654	2,124	80.0

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